Claims

What is claimed is:

1. A circuit for coupling to a photodetector for providing a received signal strength indicator (RSSI) signal comprising:

a transimpedance amplifier (TIA) stage coupled to the photodetector for receiving current flowing therethrough and for providing a TIA output signal;

a filter circuit having an input port for receiving the TIA output signal and for filtering the TIA output signal to provide a first voltage signal;

a dummy TIA stage having a dummy TIA output port for providing a second DC voltage signal;

a high gain integrator circuit having a negative input port for receiving the second DC voltage signal, having a positive input port for receiving the first voltage signal and having an output port for providing a high gain integrator output signal therefrom;

a transconductance amplifier (TCA) circuit having a negative input port for receiving the second DC voltage signal, having a positive input port for receiving the first voltage signal, and having an output port for providing a first current therefrom; and

a second current mirror having an input port for receiving the first current and a second current and for providing the RSSI signal from an output port thereof, the RSSI signal dependent upon the first and second currents.

2. A circuit according to claim 1, wherein the high gain integrator circuit comprises a first difference amplifier having a negative input port for receiving the second DC voltage signal and a positive input port for receiving the first voltage signal, the first difference amplifier having an output port for providing a first differential amplifier output signal.

3. A circuit according to claim 2, wherein the high gain integrator circuit comprises an integrator circuit having a negative input port for receiving the first differential

amplifier output signal, a positive input port for receiving a first bias signal and an output port for providing the high gain integrator output signal therefrom.

4. A circuit according to claim 3, wherein the high gain integrator circuit comprises:

a first operational amplifier having a negative input port for receiving the first differential amplifier output signal, a positive input port for receiving a first bias signal and an output port for providing the high gain integrator output signal therefrom; and,

a fourth capacitor disposed between the output port and the negative input port.

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5. A circuit according to claim 3, comprising a second transistor having a collector terminal coupled to the TIA input port and having a base terminal coupled to the high gain integrator output port for receiving the high gain integrator output signal therefrom.

6. A circuit according to claim 5, comprising an eighth resistor disposed between a second supply voltage input port and an emitter terminal of the second transistor.

7. A circuit according to claim 3, comprising a first current mirror for receiving the high gain integrator output signal and for providing the second current to the input port of the second current mirror.

8. A circuit according to claim 7, wherein the first current mirror comprises a first transistor having a base terminal coupled to the high gain integrator output port for receiving the high gain integrator output signal therefrom, the first transistor for providing the second current from a collector terminal thereof in dependence upon the high gain integrator output signal, the second current for being received by the input port of the second current mirror.

9. A circuit according to claim 8, comprising a ninth resistor disposed between a second supply voltage input port and an emitter terminal of the first transistor.

10. A circuit according to claim 1, wherein the transconductance amplifier (TCA) circuit comprises a second difference amplifier having a negative input port for receiving the second DC voltage signal and a positive input port for receiving the first voltage signal, the first difference amplifier having first and second output ports for providing second differential amplifier output signals therefrom.

11. A circuit according to claim 10, wherein the transconductance amplifier (TCA) circuit comprises a differential integrator circuit for providing a differential integrator output signal.

12. A circuit according to claim 11, wherein the transconductance amplifier (TCA) circuit comprises a third transistor for receiving of the differential integrator output signal at a base terminal and for providing the first current from a collector terminal thereof, the first current for being received by the input port of the second current mirror.

13. A circuit according to claim 12, wherein the differential integrator circuit comprises:

a second operational amplifier having a positive input port and a negative input port and an output port;

a fourth resistor disposed between the negative input port of the of the second operational amplifier and a first output port of the second difference amplifier;

a fifth resistor disposed between the positive input port of the of the second operational amplifier and a second output port of the second difference amplifier;

a seventh resistor disposed between the emitter terminal of the third transistor and the negative input port of the second operational amplifier; and,

a second capacitor disposed in parallel with the seventh resistor.

14. A circuit according to claim 1, wherein the filter circuit comprises a first resistor disposed between the TIA output port and the negative input port of the high gain integrator circuit.

15. A circuit according to claim 1, wherein the filter circuit comprises a first capacitor disposed between the negative input port of the high gain integrator circuit and a second voltage supply input port.

16. A circuit according to claim 14, comprising a second resistor disposed between the dummy TIA output port and the negative input port of the high gain integrator for propagating of the second DC voltage signal.

17. A circuit according to claim 16, wherein the first resistor and the second resistor have substantially equal resistances.

18. A circuit according to claim 12, wherein the TIA stage comprises a first feedback resistor disposed between the TIA output port and the TIA input port.

19. A circuit according to claim 18, wherein the TIA stage comprises a second feedback resistor disposed between the dummy TIA output port and the dummy TIA input port.

20. A circuit according to claim 19, wherein the transconductance amplifier (TCA) circuit comprises a third feedback resistor disposed between the emitter terminal of the third transistor and a second voltage supply input port.

21. A circuit according to claim 20, wherein the resistances of the first resistor, the second resistor, and the third resistor are substantially the same.

22. A circuit according to claim 1, comprising a first voltage input port, where the first voltage input port is for receiving a positive input voltage and where the TIA comprises a positive supply voltage input port for receiving of the positive input voltage, the same positive input voltage for biasing of the photodetector and the second current mirror.

23. A circuit according to claim 1, wherein the photodetector is a PIN diode.

24. A circuit according to claim 1, wherein the photodetector is an avalanche photodiode (APD).

25. A circuit according to claim 24, comprising:

a first voltage input port, where the first voltage input port is for receiving a first positive input voltage and where the TIA comprises a positive supply voltage input port for receiving of the first positive input voltage; and,

a third voltage input port, where the third voltage input port is for receiving a second positive input voltage that is of a higher potential than the first positive input voltage, the second positive input voltage for biasing of the APD and the second current mirror.

26. A method of providing a RSSI signal from a circuit coupled to a photodiode comprising the steps of:

propagating a photodiode current through the photodiode;

providing a transimpedance amplifier (TIA) circuit for providing of a TIA output signal in dependence upon receiving of the photodiode current from the photodiode ;

adjusting a first bias voltage;

providing a first current in dependence upon the photodiode current and the first bias voltage;

providing a second current in dependence upon the photodiode current and the first bias voltage; and,

summing the first and second currents to provide an added current, where the RSSI signal is dependent thereon.

27. A method according to claim 26, wherein the step of adjusting the first bias voltage comprises the step of providing a threshold current.

28. A method according to claim 27, wherein the RSSI signal is substantially dependent upon the first current up to a point where the added current reaches the threshold current.

29. A method according to claim 27, wherein the RSSI signal is substantially dependent upon the second current after a point where the added current exceeds the threshold current.

30. A method according to claim 26, wherein once the added current exceeds the threshold current, the first current is approximately constant with increasing photodiode current.

31. A method according to claim 26, wherein once the added current exceeds the threshold current, the second current increases approximately linearly with the increasing photodiode current.

32. A method according to claim 26, comprising the step of other than lowering a reverse bias voltage available to the photodiode when the photodiode is biased with a single ended positive voltage supply and the same single ended positive voltage supply is used for providing a positive supply voltage to the TIA circuit.

33. A method according to claim 30, wherein the step of providing the first current, comprises the steps of:

filtering of the TIA output signal to obtain the DC component of the TIA output signal in a filtered signal;

receiving a dummy TIA output signal;

differentially amplifying the dummy TIA output signal and the filtered signal;

integrating the differentially amplified signal to form a high gain integrator output signal; and,

current mirroring the high gain integrator output signal to form the first current.

34. A method according to claim 33, wherein the step of filtering comprises the step of low pass filtering to remove a portion of the noise in the TIA output signal.

35. A method according to claim 30, wherein the step of providing the second current, comprises the steps of:

filtering of the TIA output signal to obtain the DC component of the TIA output signal in a filtered signal;

receiving a dummy TIA output signal;

differentially amplifying the dummy TIA output signal and the filtered signal;

differentially integrating the differentially amplified signal to form a differential integrator output signal; and,

current mirroring the differential integrator output signal to form the second current.

36. A method according to claim 35, wherein the step of filtering comprises the step of low pass filtering to remove a portion of the noise in the TIA output signal.